'T'11 EASTRONOMICAL LOW-FREQUENCY ARRAY

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The low frequency end of the electromagnetic spectrum, from a few tens of MHz down to ~ 100 kHz, is largely inaccessible from the Earth due to the ionosphere. From space, however, a cluster of very small, inexpensive satellites operating as an interferometer array could provide radio images of the entire sky with angular resolution limited only by scattering in the interplanetary and interstellar media. 1 Data from such an array could answer a wide range of astrophysical questions about the solar system, the galaxy, and the distant universe.

This paper will discuss an innovative concept for the deployment and operation of a low-frequency array in space. A solar orbit is used to get far enough from the Earth to prevent radio interference and to minimize the cost of precise trajectory determination and control. The array consists of 16 identical spin-stabilized microsats, which are deployed into a volume 100-200 km in diameter by a single bus. Precise control of the microsat positions is not required because of the very long wavelengths being observed. Each microsat includes a pair of orthogonal dipole antennas in the spin plan, and autonomously keeps its spin axis pointed at the Sun. The deployment bus is 3-axis stabilized and is used to monitor the three-dimensional geometry of the array and to relay data from each microsat to Earth. Cross-correlation of the data and the production and deconvolution of full-sky images can be done on existing parallel computers. A detailed study of imaging algorithms for this mission is currently underway.

By basing the design of the flight hardware on previously flown commercial satellites and minimizing the complexity of ground operations, we believe that this mission can be developed and flown within the financial and schedule constraints of the medium-class Explorer (Midex) program.

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